

AbstractID: 6685 Title: By how much does summing skin doses from multiple projections overestimate the risk in cardiac imaging?

In cardiac imaging, multiple projections are used to image the coronary arteries. The resultant patient "dose" is normally obtained from a simple sum of the entrance skin doses for each projection. We have developed a method to compute the exposed area and location for each x-ray beam projection. A cardiac imaging system was used to expose an anthropomorphic phantom (Rando) with film wrapped around the surface. The size and relative location of standard projections used in cardiac imaging were determined. Entrance skin exposures were obtained using measured x-ray tube outputs and radiographic techniques selected by the operator. For each patient, we computed the ratio (R) of the true maximum skin dose to the simple sum of the entrance skin doses. For 12 patients undergoing diagnostic and therapeutic cardiac procedures, the average value of R was 0.55 ± 0.21 showing that a simple sum of entrance skin doses overestimates the true maximum skin dose by about a factor two. The average maximum skin dose was 1.1 ± 0.9 Gy, and two patients had skin doses in excess of 2 Gy - one with a skin dose of 3.5 Gy to 0.03 cm^2 of skin, and one with 2.4 Gy to 18 cm^2 of skin. For these 12 patients, the average area receiving the maximum dose was 26 cm^2 . Accounting for the x-ray beam overlap improves the ability to quantify the risk of inducing deterministic radiation effects in cardiac imaging.

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